NASA Advisory Council
National Aeronautics and Space Administration
Washington, DC 20546

General Lester L. Lyles (USAF, Ret.), Chair

September 6, 2018

Mr. James F. Bridenstine
Administrator
National Aeronautics and Space Administration
Washington, DC 20546

Dear Administrator Bridenstine:

The NASA Advisory Council held its second public meeting of 2018 at NASA Ames Research Center, Moffett Field, CA, on August 29-30, 2018.

As a result of our deliberations, and in accordance with our "two-tier" approach for transmitting recommendations and findings to the NASA leadership, the Council approved two Council recommendations and three Council findings for your consideration (enclosed). The Council also approved four Committee findings for consideration by the NASA Associate Administrators. Copies of the latter also are enclosed for your information and awareness. If you have any questions or wish to discuss this further, please do not hesitate to contact me.

This was our first NASA Advisory Council meeting with you, and on behalf of the Council, I would like to take this opportunity to convey our sincere appreciation for your leadership and active participation. It is an honor and privilege for us to serve on the Council.

I look forward to discussing these recommendations and findings with you in the future, and hearing your thoughts on whether our current format for the NASA Advisory Council meets your needs.

Sincerely,

Lester L. Lyles

General Lester L. Lyles (USAF, Ret.)
Chair

Enclosures

NASA Advisory Council Recommendation

Use of Decadal Surveys and Exploration Objectives to Set Priorities for the Gateway
2018-02-01 (HEOC/SC-01)

Name of Committee:	Human Exploration and Operations Committee Science Committee
Chair of Committee:	Mr. Kenneth Bowersox Dr. Meenakshi Wadhwa
Date of Council Public Deliberation:	August 29, 2018
Short Title of Recommendation:	Use of Decadal Surveys and Exploration Objectives to Set Priorities for the Gateway

Recommendation:
The Council recommends:

- *For the NASA Science Mission Directorate (SMD) Associate Administrator*: That the science initiatives implemented at the Gateway should be prioritized to align with the National Academies' decadal surveys.
- *For the NASA Human Exploration and Operations Mission Directorate (HEOMD) Associate Administrato*r: That the objectives for exploration initiatives enabled by the Gateway approach should be clearly articulated by HEOMD to set expectations for all stakeholders.

Major Reasons for the Recommendation:
The Council applauds the leadership of HEOMD and SMD for fostering a balance between exploration and discovery in the Gateway concept. When communicating about the Gateway concept both science and exploration should indeed be emphasized. Clearly articulated exploration objectives for the Gateway and reference to science decadal surveys will be critical as requirements for the Gateway are developed in order to set expectations for all Gateway stakeholders and prioritize future Gateway science activity.

Consequences of No Action on This Recommendation:
Failure to articulate exploration objectives and science priorities for the Gateway could result in confusion amongst stakeholders and unnecessarily decrease the effectiveness of a major NASA initiative.

NASA Advisory Council Recommendation

Elevating the Status of the
Ad Hoc Task Force on STEM Education
2018-02-02 (STEM TF-01)

Name of Committee:	Ad Hoc Task Force on STEM Education
Chair of Committee:	Dr. Aimee Kennedy
Date of Council Public Deliberation:	August 29, 2018
Short Title of Recommendation:	Elevating the Status of Ad Hoc Task Force on STEM Education

Recommendation:
The Council recommends that the NASA Advisory Council (NAC) Ad Hoc Task Force on STEM Education should become a regular committee of the NAC.

Major Reasons for the Recommendation:
A regular committee of the NAC that focuses on STEM engagement, and is made up of representatives from key stakeholder groups, will provide a set of diverse perspectives from difference constituent groups about trends and current events in the national STEM movement.

Consequences of No Action on the This Recommendation:

- The institutional knowledge developed by the current NAC Ad Hoc Task Force on STEM Education over the last 43 months will be lost.
- The Terms of Reference for the NAC Ad Hoc Task Force on STEM Education indicate that with no extension or formalization, the Task Force dissolves in November 2018.

NASA Advisory Council Finding

Exploration and Science Activity in Cislunar Space Aboard the Gateway

Name of Committee:	Human Exploration and Operations Committee Science Committee
Chair of Committee:	Mr. Kenneth Bowersox Dr. Meenakshi Wadhwa
Date of Council Public Deliberation:	August 29, 2018
Short Title of Finding:	Exploration and Science Activity in Cislunar Space Aboard the Gateway

Finding: The Council finds that the Human Exploration and Operations Committee and the Science Committee met jointly on August 29, 2018, to review plans for the development of the cislunar Gateway, some results from previous lunar science missions, and potential future exploration and science operations in cislunar space and on the lunar surface. These two NAC committees were impressed with the level of collaboration between the Science Mission Directorate (SMD) and the Human Exploration and Operations Mission Directorate (HEOMD) as well as the potential for future joint efforts. It was clear from the presentations at the joint session that there are many opportunities for valuable exploration and science activity in cislunar space aboard the Gateway. It was also evident that there is great synergy between investigations that can be performed from lunar orbit and science activity on the lunar surface. These two NAC committees look forward to a future joint session as plans mature for exploration and science activity in lunar orbit and on the surface.

NASA Advisory Council Finding

Complementary Approach to Exploration

Name of Committee:	Human Exploration and Operations Committee Science Committee
Chair of Committee:	Mr. Kenneth Bowersox Dr. Meenakshi Wadhwa
Date of Council Public Deliberation:	August 29, 2018
Short Title of Finding:	Complementary Approach to Exploration

Finding: The Council acknowledges and applauds the direction NASA has taken toward a complementary approach to exploration that facilitates a balance between exploration and scientific discovery. The approach includes work in LEO, cislunar space (currently envisioned as the Gateway), lunar surface exploration, and deep space exploration. NASA's plans have the potential to support both Human Exploration and Operations Mission Directorate (HEOMD) and Science Mission Directorate (SMD) objectives and goals, while meeting the intent of Space Policy Directive-1 (SPD-1) for a return to the Moon. This concept feature a role for international and commercial partners, reusability, sustainability, reconfigurable components, and builds toward the ultimate national vision for deep space exploration and science, including a crewed mission to Mars.

NASA Advisory Council Finding

International Partners in the Gateway Program

Name of Committee:	Human Exploration and Science Committee Science Committee
Chair of Committee:	Mr. Kenneth Bowersox Dr. Meenakshi Wadhwa
Date of Council Public Deliberation:	August 29, 2018
Short Title of Finding:	International Partners in the Gateway Program

Finding: The Council applauds NASA's inclusion of international partners in the Gateway program. The value of international cooperation goes beyond the technical synergies realized through collaborations among traditional and emerging international partners. Perhaps more importantly, space exploration, pursued as an international community, facilitates peaceful interactions at large among all participating nations.

NASA Advisory Council – Committee Finding

Aeronautics Committee Finding
to NASA Associate Administrator for
Aeronautics Research Mission Directorate

Urban Air Mobility Grand Challenge

Name of Committee:	Aeronautics Committee
Chair of Committee:	Mr. John Borghese
Date of Council Public Deliberation:	August 30, 2018
Short Title of Finding:	Urban Air Mobility Grand Challenge

Finding: The Aeronautics Committee finds that the Urban Air Mobility (UAM) Grand Challenge is a great initiative for NASA to set the leadership beacon on UAM that inspires the industry and the next generation of workforce alike. While it is in the early stage of planning, the Aeronautics Committee believes that the UAM Grand Challenge needs to be articulated more clearly. The Committee also observes that NASA's role is to study, estimate, and articulate the trade space for UAM. The Committee urges the project to work closely with universities to take advantage of the talent available. The Committee complimented NASA for the evolution of the relationship with the Federal Aviation Administration (FAA) and how this change has improved the level of collaboration.

NASA Advisory Council – Committee Finding

Aeronautics Committee Finding
to NASA Associate Administrator for
Aeronautics Research Mission Directorate

Low Boom Flight Demonstrator

Name of Committee:	Aeronautics Committee
Chair of Committee:	Mr. John Borghese
Date of Council Public Deliberation:	August 30, 2018
Short Title of Finding:	Low Boom Flight Demonstrator

Finding: The Aeronautics Committee endorses the Low Boom Flight Demonstrator (LBFD) project and congratulates NASA for developing clear project objectives and an adequate yet aggressive schedule. The Committee observed that the risk mitigation strategy has been well-developed and the goals of the project are clearly articulated. The Committee believes that the demonstrator will reinvigorate the public view of the role of Aeronautics within NASA and encourages the project to involve schools to take advantage of this opportunity to inspire the next generation.

NASA Advisory Council – Committee Finding

Science Committee Finding
to NASA Associate Administrator for
Science Mission Directorate

NASA Science Mission Directorate
Research and Analysis

Name of Committee:	Science Committee
Chair of Committee:	Dr. Meenakshi Wadhwa
Date of Council Public Deliberation:	August 30, 2018
Short Title of Finding:	NASA Science Mission Directorate Research and Analysis

Finding: The Science Committee finds that the Science Mission Directorate (SMD) should "stay the course" with the overall Research and Analysis (R&A) strategic objectives, incorporating attention to high-impact/high-risk research, as history has shown that such investment can be game-changing. Just because incremental progress is being made, it does not mean that tremendous impact is not occurring. In general, key to the selection of high-impact/high-risk proposals is for SMD to:

(1) Clearly train review panels regarding high-impact/high-risk research, and encourage proposers and review panels to address and evaluate mitigation of risk in high-impact/ high-risk proposals;
(2) Have attendant expertise on the review panels;
(3) Closely coordinate with each program manager on this approach; and
(4) Have the high-impact/high-risk solicitation remain within each SMD discipline rather than in a separate proposal call that mixes disciplines, as it could not be reviewed effectively. In each solicitation, SMD could note that high-impact/high-risk proposals are welcome. This approach results in high-impact/high-risk research embedded in each review panel for their examination, which is beneficial.

Finally, the Science Committee finds that SMD effectively responds to the scientific community when an interdisciplinary research need is identified, and sets up appropriate structures to promote such collaboration. Most interdisciplinary work is being done through collaborative research mechanism (e.g., Nexus for Exoplanet System Science (NExSS), NASA Astrobiology Institute (NAI), and may not exist outside of these. To increase emphasis:

(1) SMD could encourage the scientific community to increase communication with the Science Committee in pinpointing interdisciplinary /interdivisional opportunities; and

(2) The next SMD Research Opportunities in Space and Earth Science (ROSES) call could welcome proposals wherein astrophysics data will be used by planetary science investigators, and conversely, planetary science data will be used by astrophysics investigators.

For more information, reference "NAC Science Committee Response to SMD Research and Analysis Charge" that contains Science Committee feedback on specific questions: *http://science.nasa.gov/science-committee/meetings*

NASA Advisory Council – Committee Finding

Science Committee Finding
to NASA Associate Administrator for
Science Mission Directorate

NASA Science Mission Directorate
Big Data

Name of Committee:	Science Committee
Chair of Committee:	Dr. Meenakshi Wadhwa
Date of Council Public Deliberation:	August 30, 2018
Short Title of Finding:	NASA Science Mission Directorate Big Data

Finding: The Science Committee finds the enthusiasm of the NASA Advisory Council (NAC) Ad Hoc Task Force on Big Data (BDTF) impressive. The BDTF completed a large amount of work and provided a very thorough report. Many of the BDTF's findings and recommendations reflected the thinking of the NAC Science Committee, with divergences often having to do with how ideas are implemented by the Science Mission Directorate (SMD).

Overall, the NAC Science Committee agrees with the BDTF that SMD data archive programs and projects are performing well and are properly taking steps to modernize. However, the sheer volume, variety and velocity of NASA science data is taxing established methods and technologies. The Science Committee finds that SMD should:

(1) Make investments in hardware, software, training and education to accelerate modeling workflows;
(2) Participate in the Department of Energy's (DOE) exascale computing program;
(3) Implement a server-side analytics (SSA) capabilities (with caution)
(4) Forge a joint program with the National Science Foundation's (NSF) Big Data Innovation Regional Hubs and Spokes program; and
(5) Incorporate data science and computing advisory positions in SMD advisory committees.

In all efforts, the Science Committee underscores that it is important that data science and computing experts work closely and collegially with domain scientists to implement effective solutions that are based on an understanding of the domain.

As to the future, the Science Committee commends that an SMD Strategic Data Working Group has been set up that will bring forward these ideas, without interfering with how each division manages data.

For more information, reference "NAC Science Committee Big Data Product" that contains Science Committee feedback on each of the Science Committee's Ad Hoc Task Force on Big Data findings/recommendations: https://science.nasa.gov/science-committee/meeting